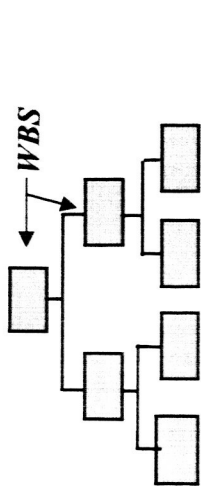

Marshall Space Flight Center In-House Earned Value System (EVS)

Presented By Donnie Smith
JE Sverdrup
October 15, 2004

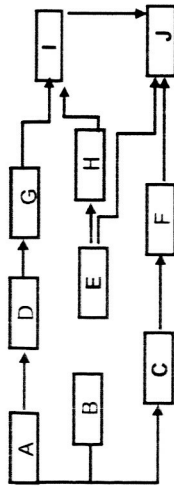
Contact information: e-mail address donnie.smith@msfc.nasa.gov phone 256-544-6917

EVM Basics

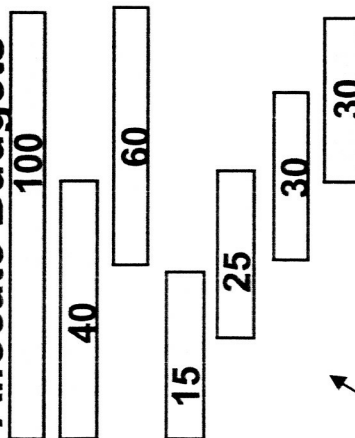
1. Define Tech. Scope



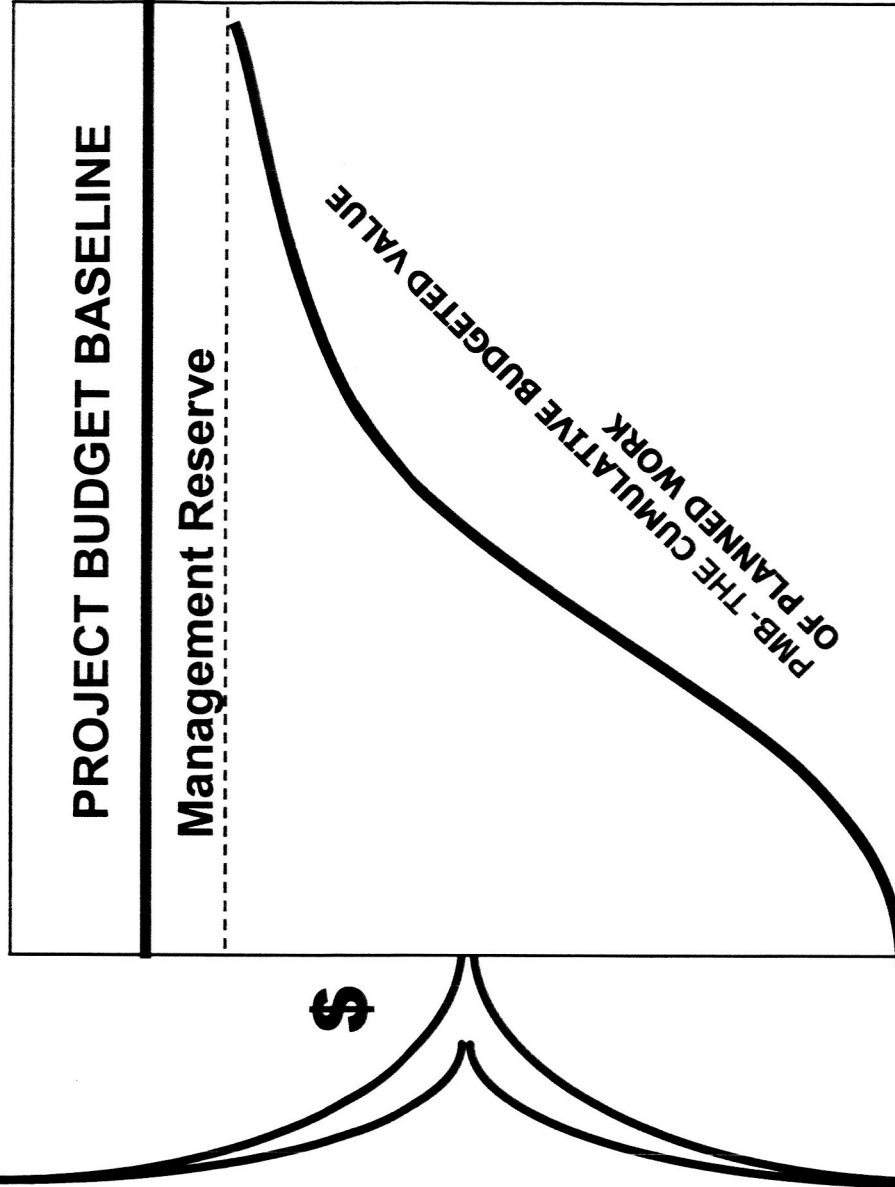
2. Schedule The Work



3. Allocate Budgets



Identify Control Accounts
& Work Pkgs @ Meaningful
Levels



MSFC In-House Earned Value Sys (EVS)

Background:

- Designed for In-house project and institutional applications
- Approach is kept simple yet practical
- Primary Tools include MS Project and Excel (Visual Basic)
- Implementation process:
 - Create WBS
 - Build schedule
 - Load resources into EVS
 - Perform monthly updates and performance measurement using actuals from IFM, Webtads, and MS Project

MSFC In-House Earned Value Sys (EVS)

■ Planning is performed in MS Project, below the Work Package

■ Resources are loaded in Excel (EVS) at the WP level

- Civil Service labor hours
- Non-labor dollars (support contractors, material, travel, etc)

■ WP Start and Finish dates are taken from the MS Project and used to establish the PMB in Excel (EVS)

■ Performance and Actuals are collected at the Control Account

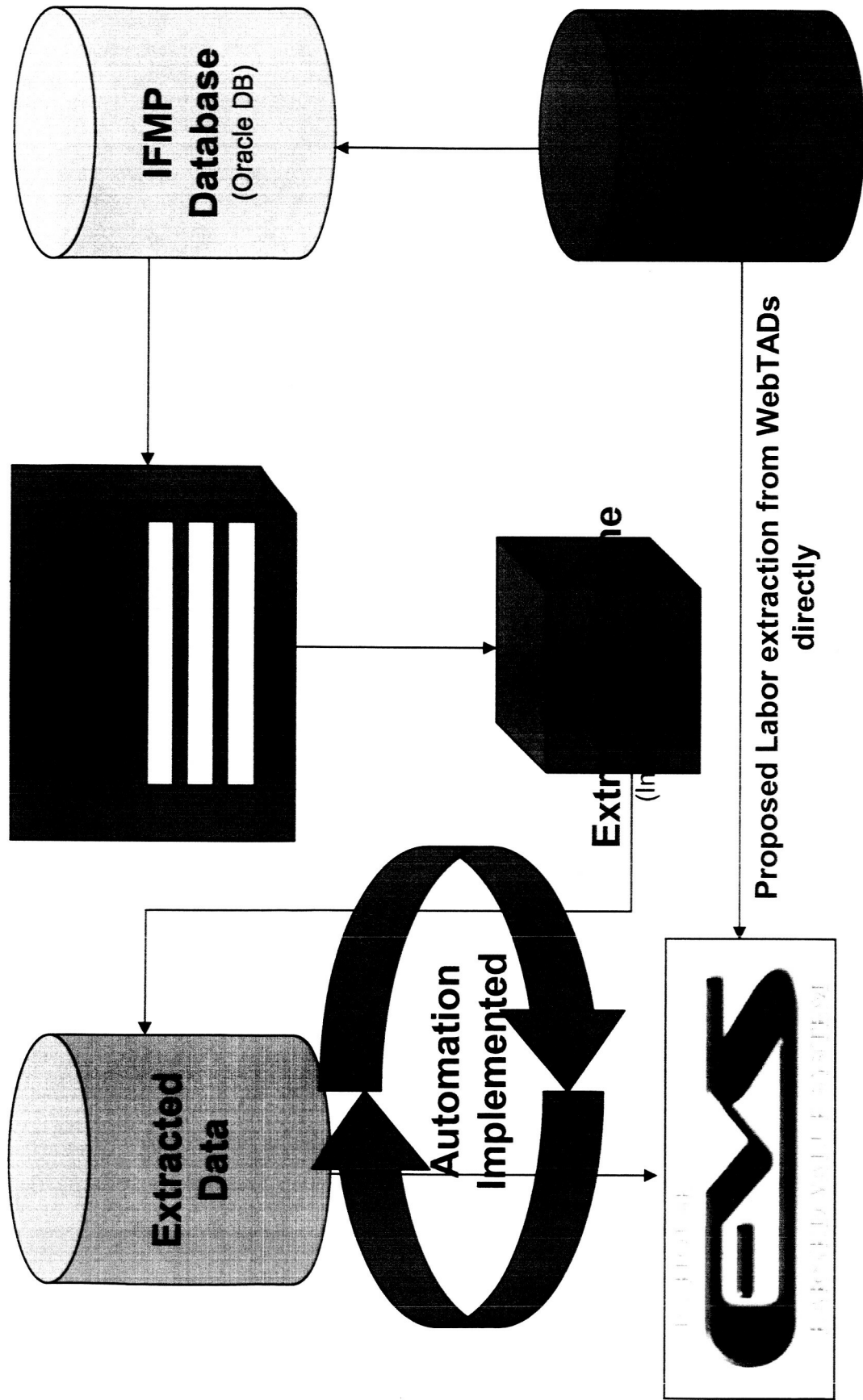
- Actuals are loaded from IFM
- Percent complete is loaded into EVS

MSFC In-House Earned Value Sys (EVS)

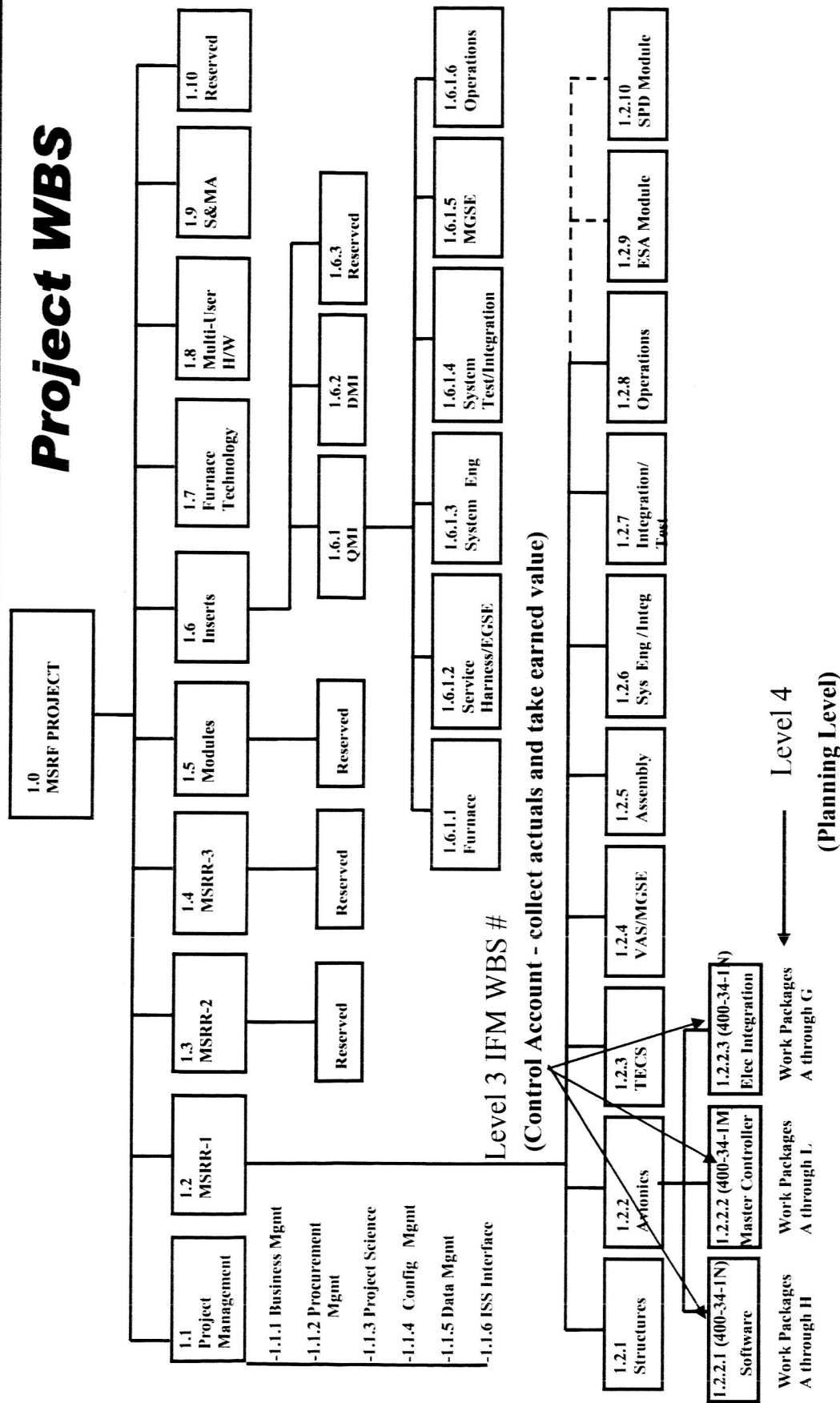
Satisfies the seven management principles contained in ANSI/EIA 748:

- *Plan all work scope to completion.*
- *Breakdown the work scope into finite pieces that can be assigned to a responsible person or organization for control of technical schedule and cost objectives.*
- *Integrate program work scope, schedule, and cost objectives into a performance measurement baseline plan against which accomplishment can be measured. Control changes to baseline.*
- *Use actual cost incurred and recorded in accomplishing the work performed.*
- *Objectively assess accomplishments at the work performance level.*
- *Analyze significant variances from the plan, forecast impacts, and prepare an EAC based on performance to date & remaining work.*
- *Incorporate EVM in the decision making & review process.*

IFMP Data Extraction Architecture



Project WBS



EVS Interface to Project Schedule

| ID# | EVS-ID (UPN#) | WP# | WBS | Name | % Comp | Start | Finish | Responsible | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----|------------------|-----|---------------|--|--------|----------|----------|-------------|------|------|------|------|------|------|
| 271 | 400 34 IN | A | 1.2.2.1 | SOFTWARE | 98% | 6/4/01 | 9/27/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 272 | 400 34 IN | A | 1.2.2.1.1 | Documentation | 96% | 6/4/01 | 3/23/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 273 | | | 1.2.2.1.1.1 | As-Built Software Design Specification | 99% | 2/4/02 | 12/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 274 | | | 1.2.2.1.1.2 | ISS-MSRR SW ICD | 99% | 6/4/01 | 12/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 275 | | | 1.2.2.1.1.3 | Del SW Build Incremental VDD | 100% | 9/30/03 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 276 | | | 1.2.2.1.1.4 | Simulation Documents | 70% | 9/20/02 | 3/23/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 277 | | | 1.2.2.1.1.4.1 | EMUT User Manual Update | 100% | 9/20/02 | 10/17/02 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 278 | | | 1.2.2.1.1.4.2 | EMUT As-Built Design Document | 65% | 10/1/03 | 3/23/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 279 | | | 1.2.2.1.1.4.3 | EMUT As-Built Doc Complete | 0% | 3/23/04 | 3/23/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 280 | 400 34 IN | B | 1.2.2.1.2 | Operational Deliveries | 0% | 12/30/03 | 12/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 281 | | | 1.2.2.1.2.1 | SW Build Delivery | 0% | 12/30/03 | 12/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 282 | 400 34 IN | C | 1.2.2.1.3 | Software Dev & Implementation | 100% | 1/7/02 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 283 | | | 1.2.2.1.3.1 | MCTS Periodic Support | 100% | 4/3/02 | 3/21/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 284 | | | 1.2.2.1.3.2 | Integration & Functional Test | 100% | 1/7/02 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 285 | 400 34 IN | D | 1.2.2.1.4 | SW Test Procedures Dev | 100% | 6/25/02 | 3/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 286 | | | 1.2.2.1.4.1 | Dev Modes of Operation | 100% | 8/1/02 | 2/15/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 287 | | | 1.2.2.1.4.2 | Dev Data Test Procedures | 100% | 6/25/02 | 3/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 288 | 400 34 IN | E | 1.2.2.1.5 | Software Verification | 93% | 5/2/02 | 2/12/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 289 | | | 1.2.2.1.5.1 | Dry Run Test Procedures | 100% | 5/2/02 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 290 | | | 1.2.2.1.5.2 | System Test | 0% | 12/31/03 | 2/12/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 291 | 400 34 IN | F | 1.2.2.1.6 | Formal Quality Test | 0% | 2/13/04 | 3/12/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 292 | | | 1.2.2.1.6.1 | Test Readiness Review (TRR) Prep | 0% | 2/13/04 | 2/19/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 293 | | | 1.2.2.1.6.2 | TRR Complete | 0% | 2/19/04 | 2/19/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 294 | | | 1.2.2.1.6.3 | Formal Quality Test | 0% | 2/20/04 | 3/12/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 295 | 400 34 IN | G | 1.2.2.1.7 | Load & Test Software | 0% | 9/22/04 | 9/27/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 296 | | | 1.2.2.1.7.1 | Load & Test SW on MC, Transfer to M | 0% | 9/22/04 | 9/27/04 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 297 | 400 34 IN | H | 1.2.2.1.8 | ENHANCED MC UNIT TESTER (EMUT) | 99% | 8/1/01 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 298 | | | 1.2.2.1.8.1 | EMUT Simulation Support for SDFS | 100% | 8/1/01 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 299 | | | 1.2.2.1.8.1 | Support Flight SW Dev Unit Dry F | 100% | 11/5/01 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 300 | | | 1.2.2.1.8.2 | Develop SW for post test data ana | 100% | 1/30/02 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 301 | | | 1.2.2.1.8.3 | Post test data analysis SW available | 100% | 9/30/03 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 302 | | | 1.2.2.1.8.4 | EMUT Verification w/ MC Dev U | 100% | 8/1/01 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |
| 303 | | | 1.2.2.1.8.5 | EMUT SW Build Delivery | 100% | 9/30/03 | 9/30/03 | ED14 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 | 6/4 |

The IFM WBS# (UPN#) is maintained in the MS Project Field Text 29

The WP# is maintained in Text 27

The Person/Org responsible is maintained in Text 30

Required for Integration of Cost &
Schedule within EVS

Report

Create

Edit/View

Import

Export

Maintenance

Project

Control Account


Close

Acronyms

Thumbnail

Preferences

10-10-99



Earned Value System

Earned Value System

Earned Value System

Close

Acronyms


Thumbnail

Preferences

Project

Control Account

10-10-99

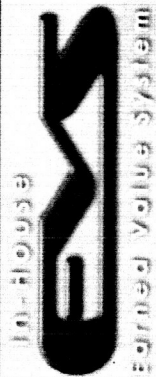


Earned Value System

Earned Value System

Earned Value System

EVS Home Page



10-10033
B Start 5/28/2002 B Finish 5/12/2004
C Start C Finish

Control Account View

EV Performance @ CA Level

| % Scheduled | % Earned | % Spent | BAC | EAC | MGR EAC |
|-------------|----------|---------|-----------|-----------|---------|
| Hrs: 87.3% | 69.0% | 83.2% | 20,120 | 22,697 | |
| (\$): 86.9% | 70.0% | 79.7% | \$373,000 | \$400,002 | |

As-Of Cum

Nov-03

Total (BAC)

| Resource/Activity | Labor | Scheduled Cum | Cum | Monthly |
|-------------------|-------|---------------|-------|---------|
| Percent Complete | | | 69.0% | |

| | | |
|------------------------------|-----------|-----------|
| Budgeted FTEs Average (BCWS) | 4.15 | 11.60 |
| Budgeted Hours (BCWS) | 17,560.00 | 20,120.00 |
| Earned Hours (BCWP) | 13,882.80 | |
| Actual Hours (ACWP) | 16,748.00 | |
| Budgeted Dollars (BCWS) | \$0 | |
| Earned Dollars (BCWP) | \$0 | |
| Actual Dollars (ACWP) | \$0 | |

Labor Actuals from Webtads

| Other Direct Costs | Cum | Monthly |
|--------------------|-------|---------|
| Percent Complete | 74.0% | |

Support Contractors

| | | |
|-------------------------|-----------|-----------|
| Budgeted Dollars (BCWS) | \$304,000 | \$353,000 |
| Earned Dollars (BCWP) | \$261,220 | |
| Actual Dollars (ACWP) | \$297,399 | |

Other Direct Costs from IFM (BW)

| Travel | Cum | Monthly |
|------------------|------|---------|
| Percent Complete | 0.0% | |

| | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|------------|------------|
| Control Account | WP1 | WP2 | WP3 | WP4 | WP5 | Total (\$) | Total (\$) |
| | | | | | | \$3,000 | \$3,000 |

Control Acct.

Work Pkgs

Baseline & Current Schedule from MS Project

CA ID 400-34-1F
CA CWC
CA Manager ED15
CA Fund
CA Order
Tech WBS
CA WBS 12

Description ELECTRICAL INTEGRATION

% Complete from MS Project

| May-02 | Jun-02 | Jul-02 | Aug-02 | Sep-02 | Total FY02 |
|--------|--------|--------|--------|--------|------------|
| 1.0% | 2.0% | 3.0% | 3.0% | 4.0% | 0 |

| | | | | | |
|--------|--------|--------|--------|--------|----------|
| 2.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.10 |
| 400.00 | 320.00 | 320.00 | 480.00 | 320.00 | 1,840.00 |
| 201.20 | 402.40 | 603.60 | 603.60 | 804.80 | 2,615.60 |
| 320.00 | 320.00 | 320.00 | 480.00 | 990.00 | 2,430.00 |
| 0 | 0 | 0 | 0 | 0 | \$0 |
| 0 | 0 | 0 | 0 | 0 | \$0 |
| | | | | | \$0 |

| | | | | | |
|------|------|------|------|------|--|
| 1.0% | 2.0% | 3.0% | 4.0% | 5.0% | |
|------|------|------|------|------|--|

| | | | | | |
|-------|-------|--------|--------|--------|----------|
| 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | \$35,000 |
| 3,530 | 7,060 | 10,590 | 14,120 | 17,650 | \$52,950 |
| 4,000 | 7,900 | 10,000 | 14,500 | 17,899 | \$54,299 |

| | |
|-----------------------|-----------------|
| Cost vs Schedule (\$) | Complete vs \$f |
|-----------------------|-----------------|

Assorted Graphs

B Start 6/2/2003
C Start 9/30/2003
B Finish 9/30/2003
C Finish 9/30/2003

Work Package View

Cost Skill

Resource/Activity Center Code Total (BAC)

| Labor (click here to add a row) | Hours Per Month | Total (BAC) |
|---------------------------------------|-----------------|-------------|
| Combustion Research: ED20 229-13 | 1.25 | |
| Administrative Support ED10 115 | 1.00 | |
| Aerodynamics ED30 101 | 1.00 | |
| Architect: ED20 401-01 | 1.00 | |
| Advanced Propulsion Resea ED10 213-13 | 1.00 | |
| Total FTEs | 5.25 | |
| Total Labor Hours | 3,800.00 | |

Other Direct Costs

Support Contractors (click here to add a row)

| | |
|--|-----------------|
| SAC ED10 | 20,000 |
| Sverdrup ED20 | 28,000 |
| | 0 |
| | 0 |
| | 0 |
| Total Support Contractors Dollars | \$48,000 |

Travel (click here to add a row)

| | |
|-----------------------------|----------------|
| End-of-year trip (1) | 1,000 |
| | 0 |
| | 0 |
| | 0 |
| | 0 |
| Total Travel Dollars | \$1,000 |

Contracts (click here to add a row)

| | |
|--------------------------------|------------|
| | 0 |
| | 0 |
| | 0 |
| | 0 |
| | 0 |
| | 0 |
| Total Contracts Dollars | \$0 |

Material (click here to add a row)

| | |
|-------------------------------|------------|
| | 0 |
| | 0 |
| | 0 |
| | 0 |
| | 0 |
| | 0 |
| Total Material Dollars | \$0 |

Training (click here to add a row)

| | |
|--|---|
| | 0 |
|--|---|

ControlAccount WP1 / WP2 / WP3 / WP4 / WP5 / Total (\$) / Total (\$) by Contractor / Cost vs Schedule (\$) / Complete vs Spent (\$) / Efficiency (%)

WP ID 400-34-1F WP Manager SD40 WP WBS 1.2.1

Description Monitor SSPCM Control (FU & SU)

Jun-03 Jul-03 Aug-03 Sep-03 Total FY03

| | 160 | 240 | 160 | 160 | |
|---------------|-----------------|---------------|---------------|---------------|------|
| 1.50 | 1.50 | 1.50 | 1.00 | 1.00 | 1.25 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 5.50 | 5.50 | 5.50 | 5.00 | 5.00 | 5.25 |
| 880.00 | 1,320.00 | 800.00 | 800.00 | 950.00 | |

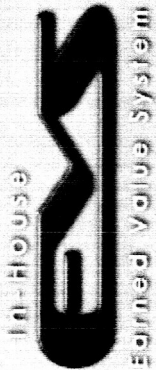
| | | | | |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| 5,000 | 5,000 | 5,000 | 5,000 | 20,000 |
| 7,000 | 7,000 | 7,000 | 7,000 | 28,000 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| \$12,000 | \$12,000 | \$12,000 | \$12,000 | \$48,000 |

| | | | | |
|------------|------------|------------|----------------|----------------|
| | | | 1,000 | 1,000 |
| | | | 0 | 0 |
| | | | 0 | 0 |
| | | | 0 | 0 |
| | | | 0 | 0 |
| \$0 | \$0 | \$0 | \$1,000 | \$1,000 |

| | | | | |
|------------|------------|------------|------------|------------|
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| \$0 | \$0 | \$0 | \$0 | \$0 |

| | | | | |
|------------|------------|------------|------------|------------|
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| \$0 | \$0 | \$0 | \$0 | \$0 |

Resources Loaded at Work
Pkg level for Labor and other
elements of cost



| | % Scheduled | % Earned | % Spent | BAC | EAC | MGR EAC |
|-------|-------------|----------|---------|-------------|-------------|---------|
| Hrs: | 91.8% | 88.0% | 93.3% | 70,360 | 74,210 | |
| (\$): | 91.1% | 82.1% | 85.2% | \$1,246,500 | \$1,270,021 | |

| Resource/Activity | As-Of Cum | Total (BAC) |
|-------------------|-----------|-------------|
|-------------------|-----------|-------------|

| | | |
|-------------------------------|-------------|-------------|
| Total Budgeted Hours (BCWS) | 64600 | 70360 |
| Total Budgeted Dollars (BCWS) | \$1,135,500 | \$1,246,500 |

| | | |
|-----------------------------|-------------|--|
| Total Earned Hours (BCWP) | 61934.76 | |
| Total Earned Dollars (BCWP) | \$1,023,767 | |

| | | |
|-----------------------------|-------------|--|
| Total Actual Hours (ACWP) | 65648 | |
| Total Actual Dollars (ACWP) | \$1,061,754 | |

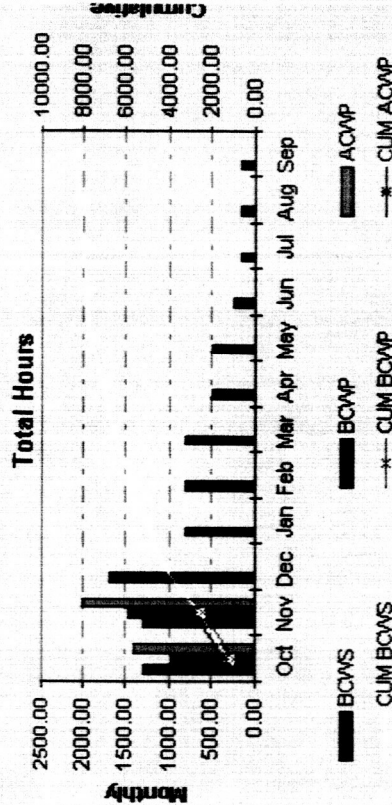
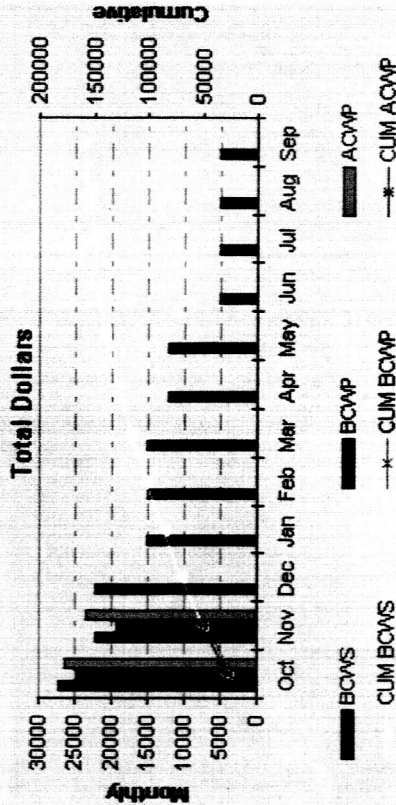
| | | |
|-------------------------|--|--|
| Management Reserve (MR) | | |
|-------------------------|--|--|

| | | |
|-------------------------|--|--|
| Support Services (ODIN) | | |
|-------------------------|--|--|

| | | |
|------------------------------|--|--|
| Performance Meas. Sys. (PMS) | | |
|------------------------------|--|--|

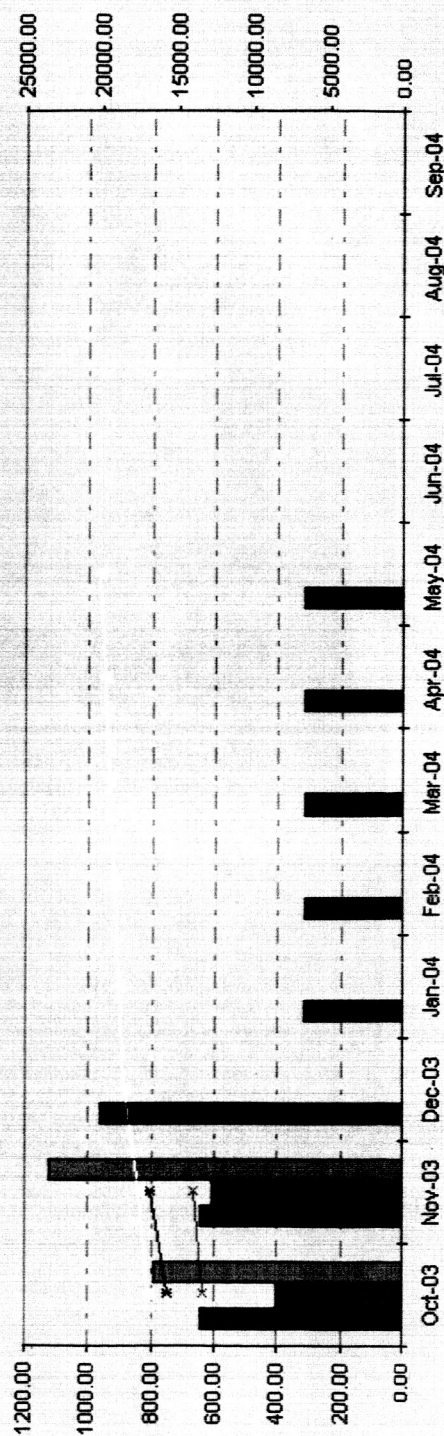
| | | |
|-----------|------------------------|------|
| Main Menu | ELECTRICAL INTEGRATION | View |
|-----------|------------------------|------|

Project Summary





**IN-HOUSE EARNED VALUE SYSTEM
MSRR-1 ELECTRICAL INTEGRATION CONTROL ACCOUNT
TOTAL (FROM PROJECT START HOURS)**

[illegible]

Note: EVS provides 20 miscellaneous internal graphs with Numerous additional graphs and reports becoming available through interface to “wlnsight” analysis tool.